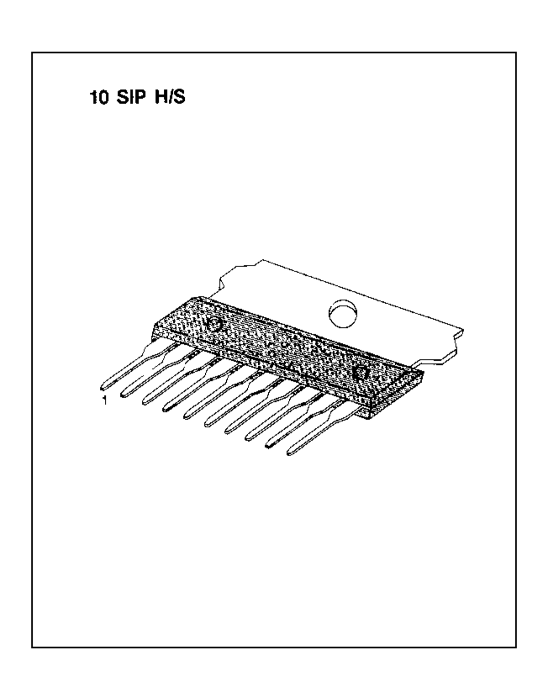
MOTOR DRIVER FOR VTR

The KA8301 is a monolithic integrated circuit designed to perform bi-directional DC motor driving, braking and speed control for VCRs. The speed control can be achieved by adjusting the external voltage of the motor speed control pin.



FEATURES

- Stable braking characteristics by built-in braking function.
- Built-in element to absorb dash current derived from changing motor direction and braking motor driving.
- Built-in external motor speed control pin.
- Stable driving direction change.
- CMOS logic level compatable input level.

APPLICATION

- VCR
- CDP
- TOY

ORDERING INFORMATION

Device	Package	Operating Temperature
KA8301	10 SIP H/S	– 25 ~ + 75°C

BLOCK DIAGRAM

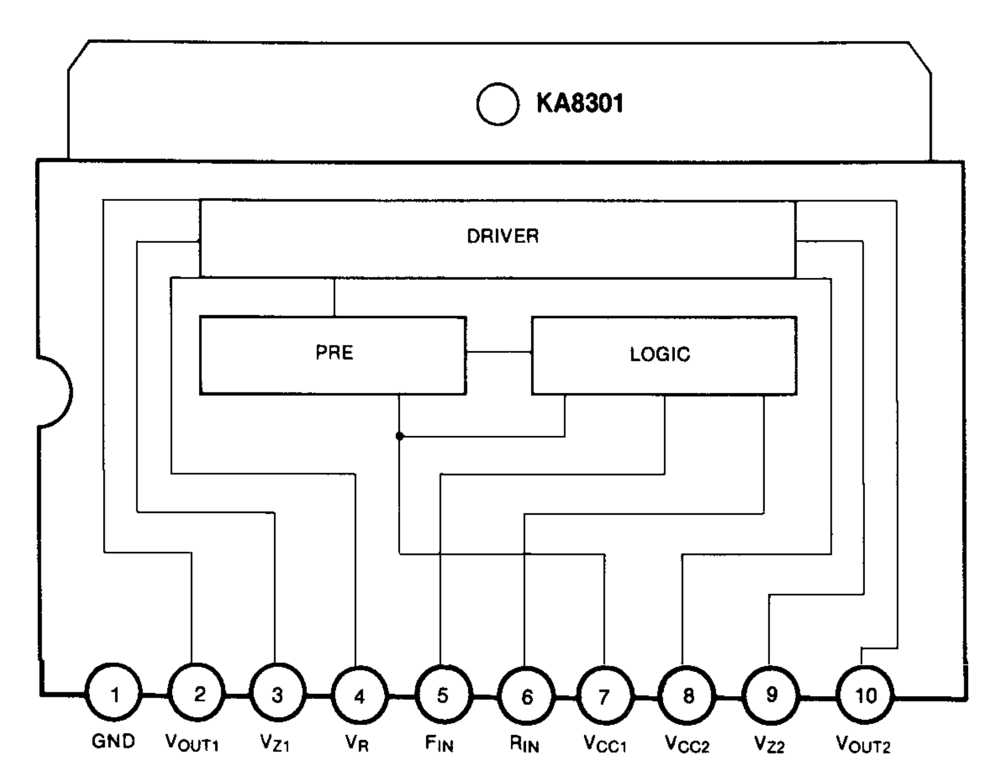


Fig. 1

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Characteristics	Symbol	Value	Unit
Supply Voltage	V_{CC}	18	V
Allowable Power Dissipation	P_D	2.2	W
Operating Temperature	T_{OPR}	−25 ~ +75	°C
Storage Temperature	T_{STG}	−55 ~ +125	°C
Output Current	I_{OUT}	1.6*	A
Input Voltage	V_{IN}	−0.3 ~ V_{CC}	V

* Duty 1/100, pulse width 500μs

RECOMMENDED OPERATING CONDITIONS (Ta = 25°C)

Characteristics	Symbol	Min	Typ	Max	Unit
Supply Voltage	V_{CC}	8	12	16	V

ELECTRICAL CHARACTERISTICS (V_{CC} = 12V, Ta = 25°C)

Characteristics	Symbol	Min	Typ	Max	Unit	Condition
Quiscent Current	I_{CCQ}	3	5.5	10	mA	Pin 5, 6: GND, $R_L = \infty$
Minimum Input on Current 1	I_{IN1}	—	10	50	μA	$R_L = \infty$, Pin 5: I_{IN1}, Pin 6: L
Minimum Input on Current 2	I_{IN2}	—	10	50	μA	$R_L = \infty$, Pin 5: L, Pin 6: I_{IN2}
Input Threshold Voltage 1	V_{INTH1}	0.7	1.3	2.0	V	$R_L = \infty$, Pin 5: V_{INTH1}, Pin 6: L
Input Threshold Voltage 2	V_{INTH2}	0.7	1.3	2.0	V	$R_L = \infty$, Pin 5: L, Pin 6: V_{INTH2}
Output Leakage Current 1	I_{OL1}	—	—	1	mA	$R_L = \infty$, Pin 5, 6: GND
Output Leakage Current 2	I_{OL2}	—	—	1	mA	$R_L = \infty$, Pin 5, 6: GND
Zener Current 1	I_{Z1}	—	0.85	1.5	mA	Pin 5: H, Pin 6: L, $R_L = \infty$
Zener Current 2	I_{Z2}	—	0.85	1.5	mA	Pin 5: L, Pin 6: H, $R_L = \infty$
Output Voltage 1	V_{O1}	6.6	7.2		V	Pin 5: H, Pin 6: L, R_L = 60ohm
Output Voltage 2	V_{O2}	6.6	7.1		V	Pin 5: L, Pin 6: H, R_L = 60ohm
Saturation Voltage Pin 10-1	$V_{CE10\text{-}1}$	—	0.83	1.5	V	I_{SINK} = 100mA Pin 5: H, Pin 6: L, R_L, $R_C = \infty$
Saturation Voltage Pin 2-1	$V_{CE2\text{-}1}$	—	0.83	1.5	V	I_{SINK} = 100mA Pin 5: L, Pin 6: H, R_L, $R_C = \infty$
Saturation Voltage Pin 8-2	$V_{CE8\text{-}2}$	—	0.83	1.5	V	I_{SOURCE} = 100mA Pin 5: H, Pin 6: L, R_L $R_C = \infty$
Saturation Voltage Pin 8-10	$V_{CE8\text{-}10}$	—	0.83	1.5	V	I_{SOURCE} = 100mA Pin 5: L, Pin 6: H, R_L, $R_C = \infty$

TEST CIRCUIT

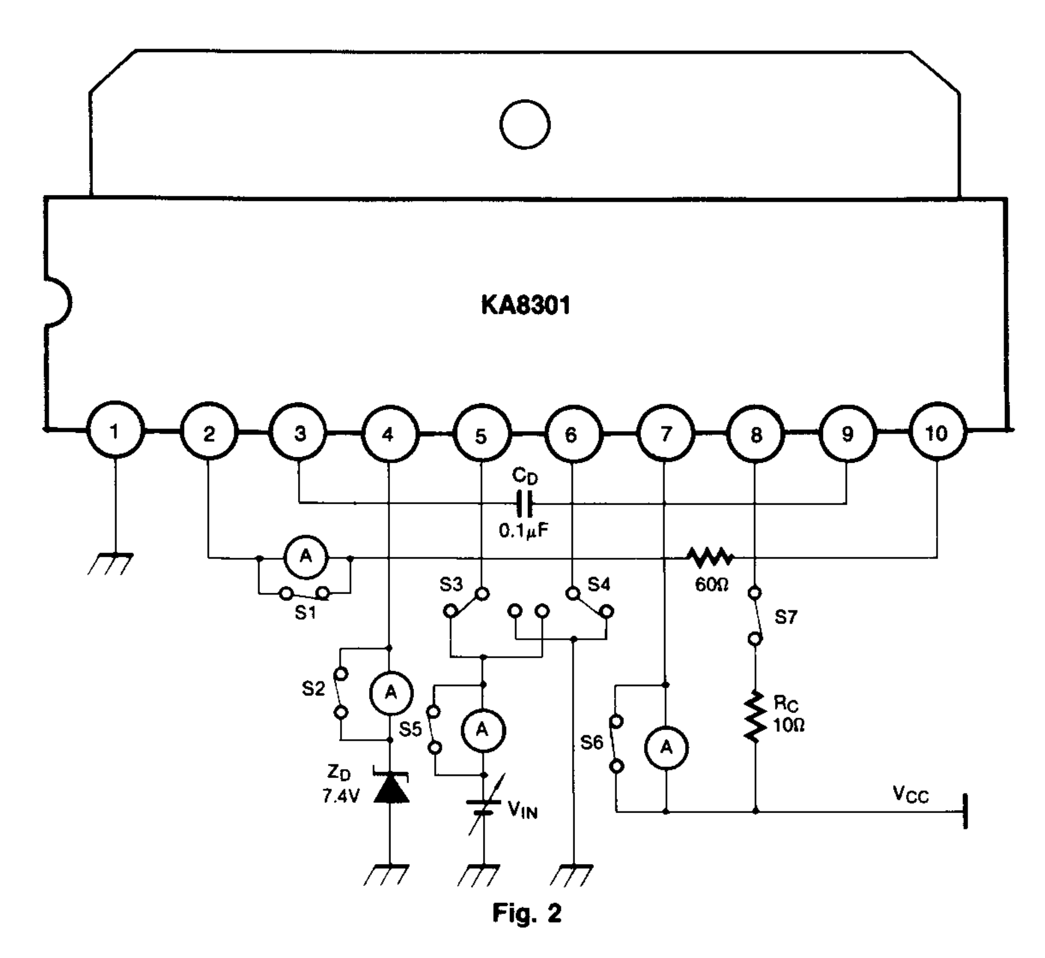


Fig. 2

LOGIC TRUTH TABLE

F_{IN} (Pin 5)	R_{IN} (Pin 6)	V_{O1} (Pin 2)	V_{O2} (Pin 10)	Note
L	L	L	L	Braking
L	H	L	H	Reverse
H	L	H	L	Forward
H	H	L	L	Braking

* Input Level 'H' > 2.0V
Input Level 'L' < 0.7V

APPLICATION INFORMATION

- FORWARD & REVERSE CONTROL LOGIC

  If F_{IN} (5 pin) & R_{IN} (6 pin) = 'L', load current (I_L) flows from V_{OUT1} (2 pin) to V_{OUT2} (10 pin).

  If F_{IN} = 'L' & R_{IN} = 'H', load current (I_L) flows from V_{OUT2} to V_{OUT1}.

- FORCED STOP LOGIC

  If F_{IN} & R_{IN} = 'H' or 'L'. The device stops supplying power to motor while absorbing counter electromotive force from the motor as a brake.

- RUSH CURRENT ABSORBING CIRCUIT

  If a high voltage generated during reversing operation is applied across V_{OUT1} & V_{OUT2}, an internal comparator activates the rush current absorbing circuit.

- DRIVING STAGE

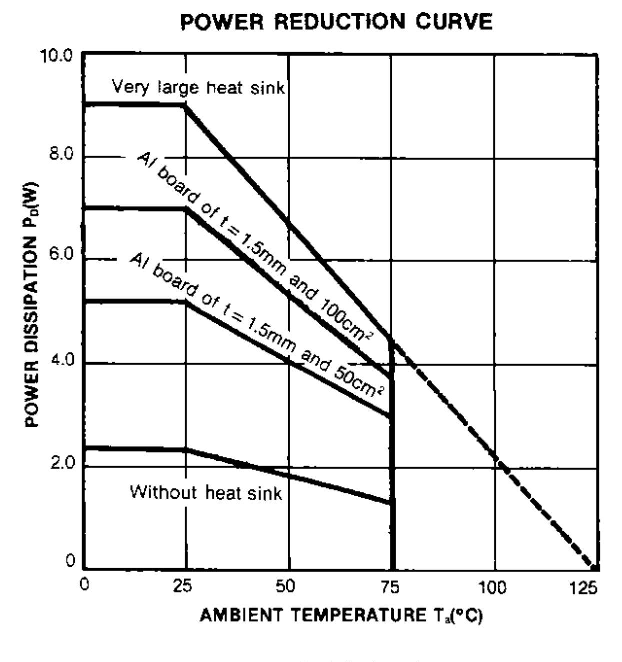
  In the forward mode, the driving stage supplies a load current to the motor from 2 pin to 10 pin. In the reverse mode. It supplies the current from 10 pin to 2 pin.

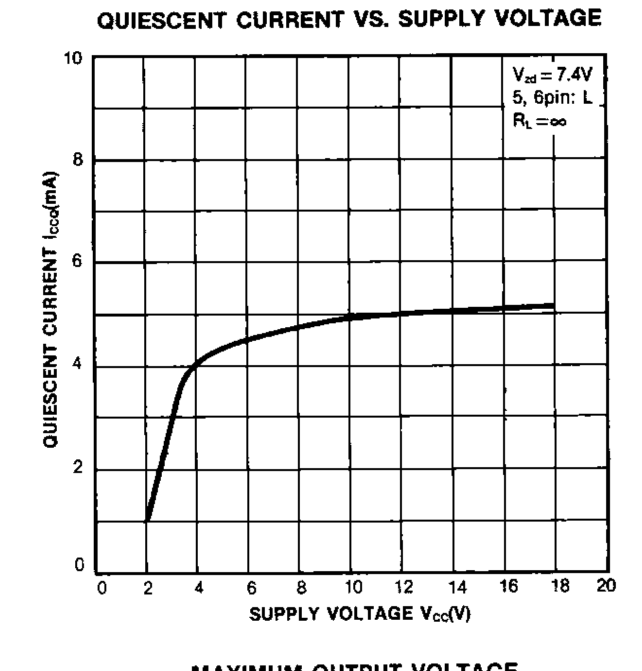
  The output voltage V_{OUT} applied to the motor is given by the following method:

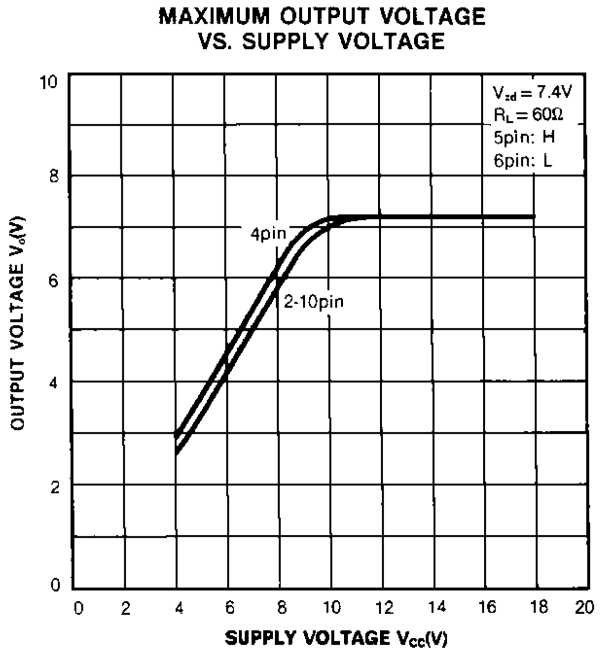
  $V_{OUT\,(V)} = V_{ZD}\text{-}V_{CE\,(SAT)}$ V_{ZD}; Zener Voltage applied to 4 pin.

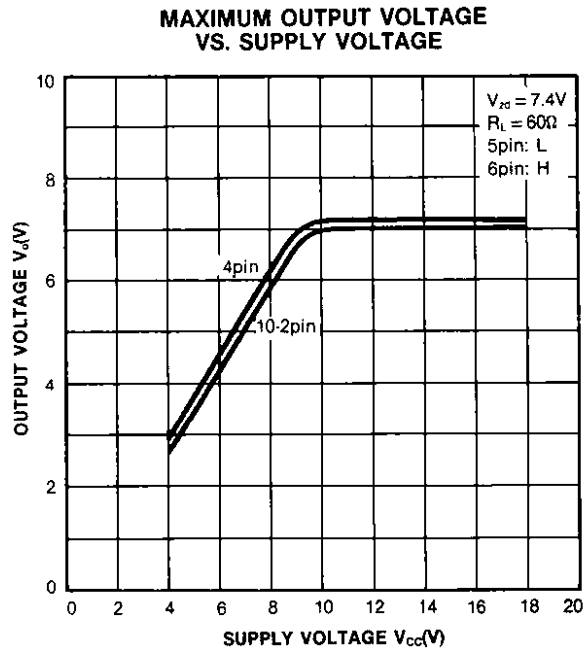
  If 4 pin is left open, the output voltage is given by the following method:

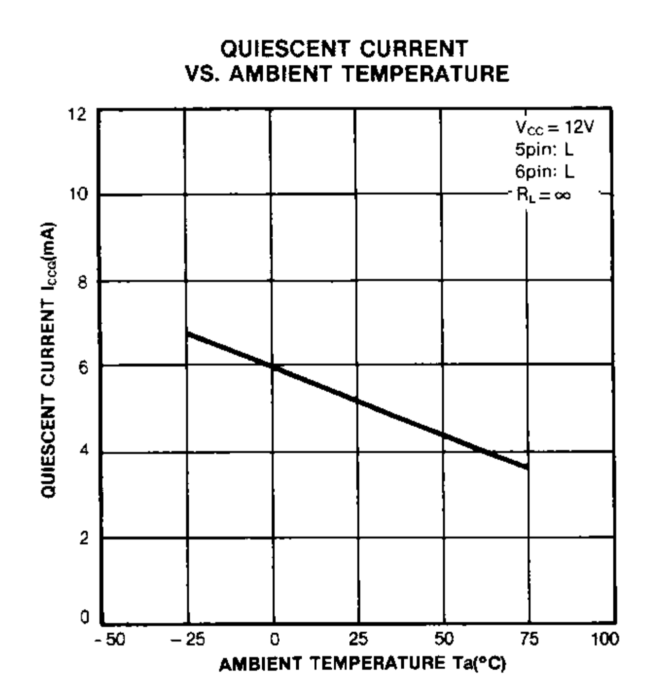
  $V_{OUT\,(V)} = V_{CCI}\text{-}V_{CE\,(SAT\,PNP)}2V_F\text{-}V_{CE\,(SAT)}$

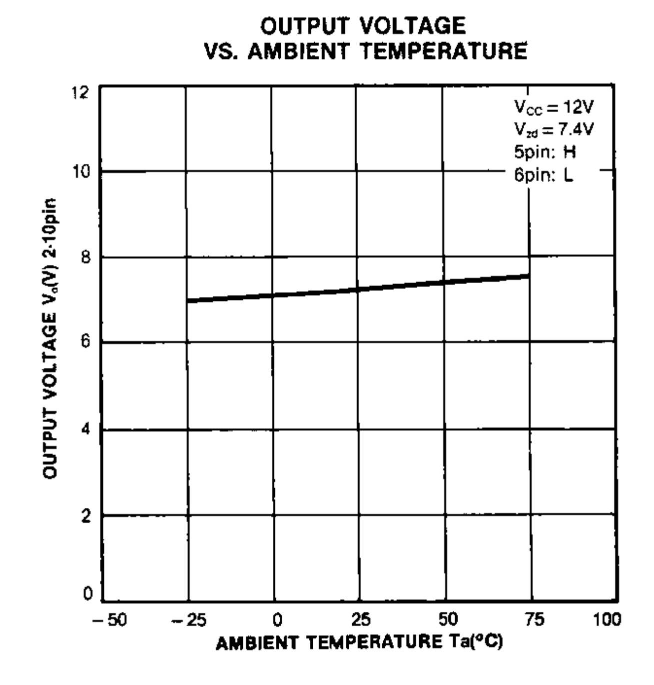

POWER REDUCTION CURVE
Very large heat sink
Al board of t = 1.5mm and 100cm²
Al board of t = 1.5mm and 50cm²
Without heat sink
POWER DISSIPATION P_D(W)
AMBIENT TEMPERATURE T_a(°C)
10.0
8.0
6.0
4.0
2.0
0
0
25
50
75
100
125


QUIESCENT CURRENT VS. SUPPLY VOLTAGE
V_{zd} = 7.4V
5, 6pin: L
R_L = ∞
QUIESCENT CURRENT I_{CCQ}(mA)
SUPPLY VOLTAGE V_{CC}(V)


MAXIMUM OUTPUT VOLTAGE
VS. SUPPLY VOLTAGE
V_{zd} = 7.4V
R_L = 60Ω
5pin: H
6pin: L
4pin
2-10pin
OUTPUT VOLTAGE V_o(V)
SUPPLY VOLTAGE V_{CC}(V)

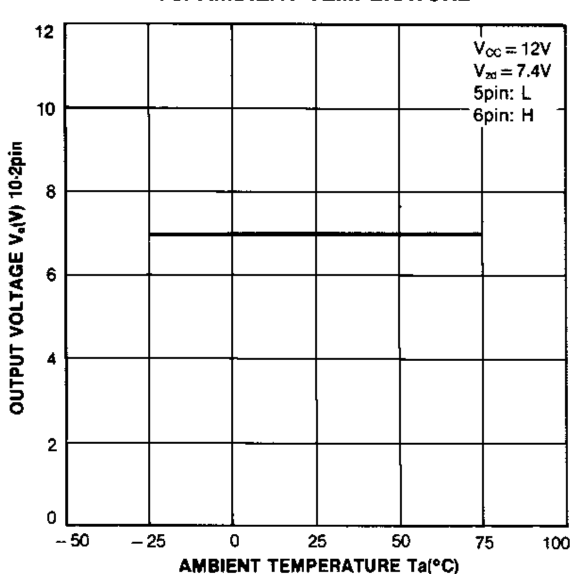

MAXIMUM OUTPUT VOLTAGE
VS. SUPPLY VOLTAGE
V_{zd} = 7.4V
R_L = 60Ω
5pin: L
6pin: H
4pin
10-2pin
OUTPUT VOLTAGE V_o(V)
SUPPLY VOLTAGE V_{CC}(V)


QUIESCENT CURRENT
VS. AMBIENT TEMPERATURE
V_{CC} = 12V
5pin: L
6pin: L
R_L = ∞
QUIESCENT CURRENT I_{CCQ}(mA)
AMBIENT TEMPERATURE Ta(°C)

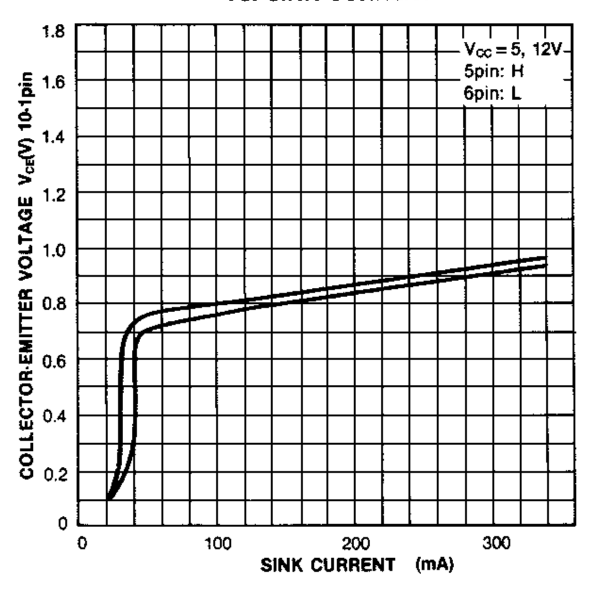

OUTPUT VOLTAGE
VS. AMBIENT TEMPERATURE
V_{CC} = 12V
V_{zd} = 7.4V
5pin: H
6pin: L
OUTPUT VOLTAGE V_o(V) 2-10pin
AMBIENT TEMPERATURE Ta(°C)



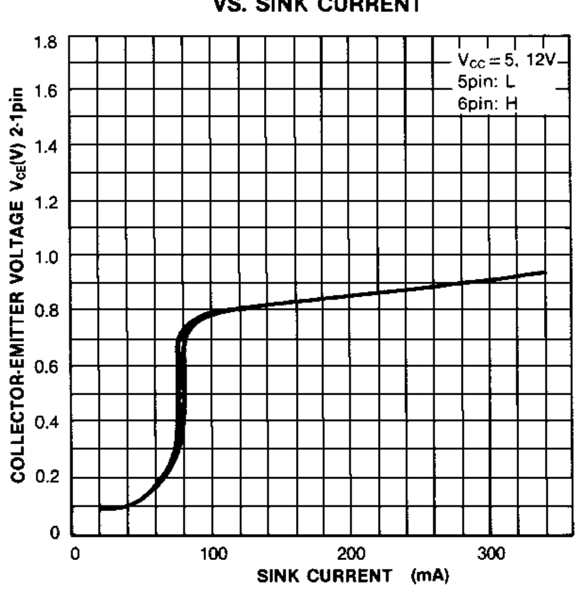
OUTPUT VOLTAGE VS. AMBIENT TEMPERATURE



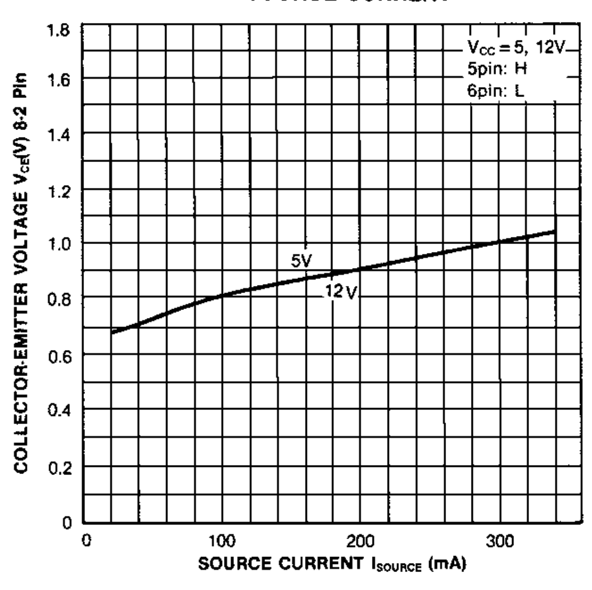
OUTPUT SATURATION VOLTAGE VS. SINK CURRENT



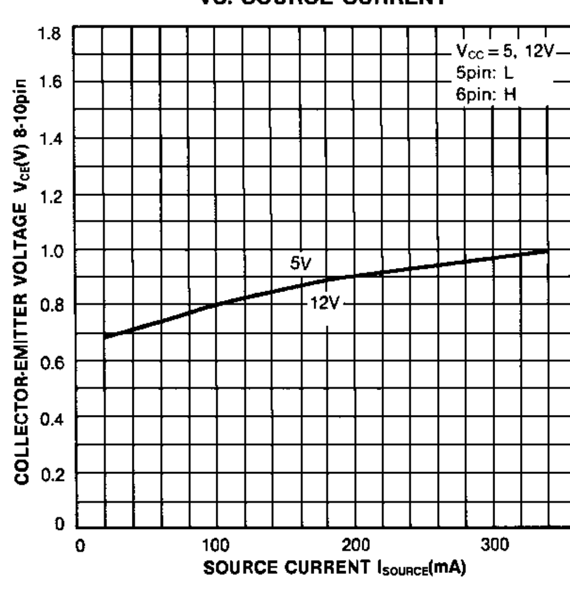
OUTPUT SATURATION VOLTAGE VS. SINK CURRENT



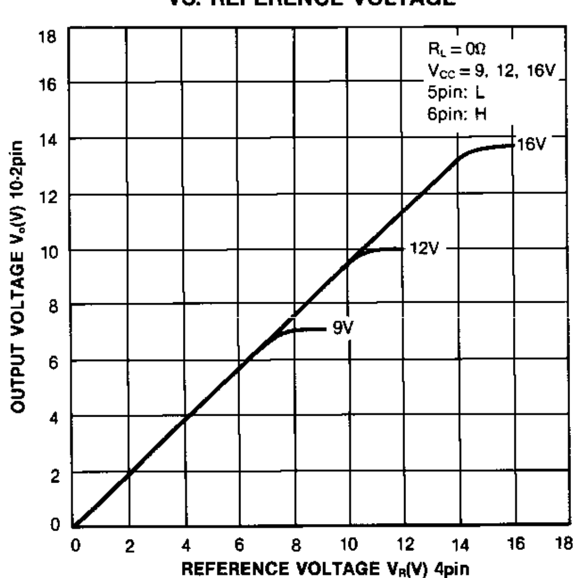
OUTPUT SATURATION VOLTAGE VS. SOURCE CURRENT



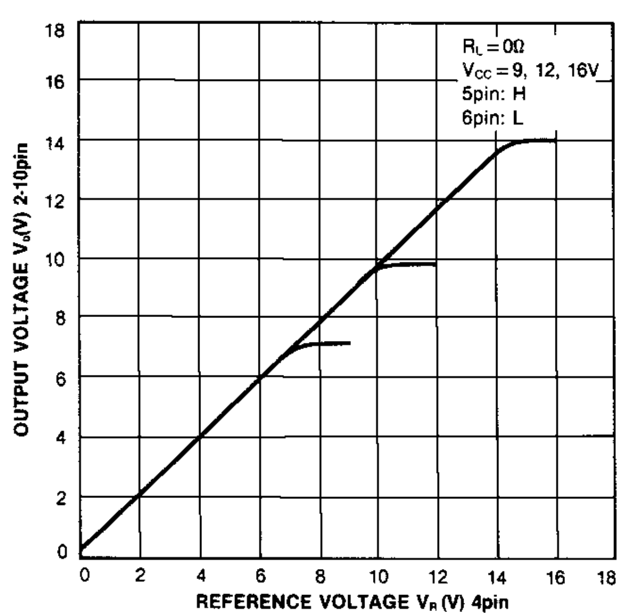
OUTPUT SATURATION VOLTAGE VS. SOURCE CURRENT

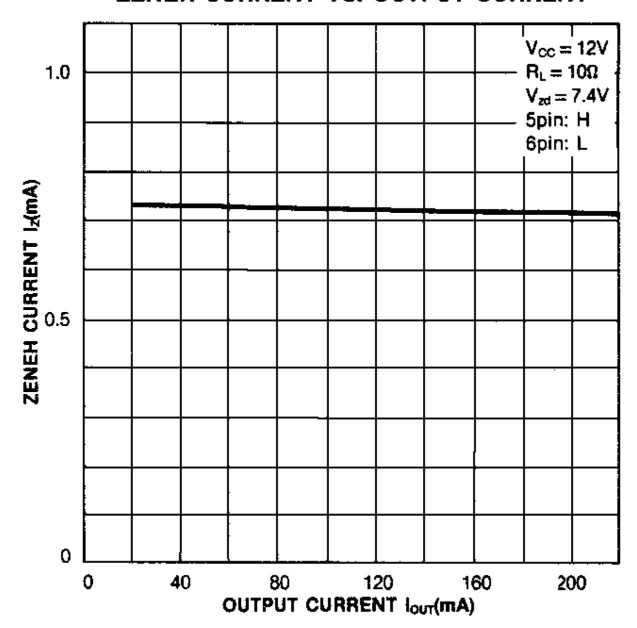


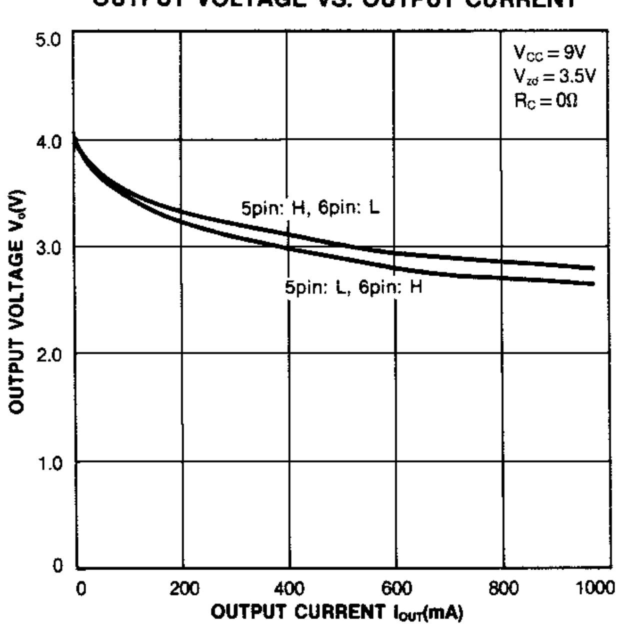
OUTPUT VOLTAGE VS. REFERENCE VOLTAGE






OUTPUT VOLTAGE VS. REFERENCE VOLTAGE
$R_L = 0\Omega$
$V_{CC} = 9, 12, 16V$
5pin: H
6pin: L
OUTPUT VOLTAGE V_o(V) 2-10pin
REFERENCE VOLTAGE V_R (V) 4pin
0
2
4
6
8
10
12
14
16
18


ZENER CURRENT VS. OUTPUT CURRENT
$V_{CC} = 12V$
$R_L = 10\Omega$
$V_{zd} = 7.4V$
5pin: H
6pin: L
ZENEH CURRENT I_z(mA)
1.0
0.5
0
40
80
120
160
200
OUTPUT CURRENT I_{OUT}(mA)


OUTPUT VOLTAGE VS. OUTPUT CURRENT
$V_{CC} = 9V$
$V_{zd} = 3.5V$
$R_C = 0\Omega$
5pin: H, 6pin: L
5pin: L, 6pin: H
OUTPUT VOLTAGE V_o(V)
5.0
4.0
3.0
2.0
1.0
0
200
400
600
800
1000
OUTPUT CURRENT I_{OUT}(mA)